To the Honourable the Commons of Great Britain, in Parliament assembled,

The humble PETITION of JOSEPH BRAMAH, of Piccadilly, in the County of Middlesex, Engineer,

SHEWETH,

THAT your Petitioner, who has been the Author of many useful Inventions, obtained His Majesty's Letters Patent, bearing Date the 23d Day of April 1784, for that Part of Great Britain called England, and the Town of Berwick upon Tweed, for the Term of Fourteen Years from the Date thereof, for the sole Use, Exercise, Benefit, and Advantage of his Invention of a new Sort of Lock for Doors, Drawers, Cabinets, and every other Purpose for which secure Fastenings are required.

THAT your Petitioner, in pursuance of a Proviso in that Behalf contained in the said Letters Patent, caused a particular Description of the said Invention to be inrolled in the High Court of Chancery, on the 21st Day of August 1784.

THAT after obtaining the said Letters Patent, your Petitioner found that, in order to sell the Locks of various Kinds, which he had invented as aforesaid, at such a Price as should enable the Public in general to purchase them for all the Uses and Purposes to which the very imperfect and insecure Locks theretofore in Use had been applied, it was necessary for him to construct and fit up various large and very expensive Machines of his own Invention, and large Buildings and Apparatus for using and working the same; all which your Petitioner hath finished and brought to Perfection with infinite Care, Labour, and Attention, and at an enormous Expence.

THAT by Means of these Exertions and heavy Expenditures your Petitioner enabled himself to supply the Public with the said Locks, made with the utmost Accuracy, and in a high Degree of Perfection, at a Price far below what, at the Commencement of his Undertaking, it was possible for him to do; and your Petitioner accordingly availed himself, as speedily as he could, to serve the Public at such reduced Prices as not to nett to himself Five per Centum Profit on the Capital invested and employed in the Undertaking.

THAT for the Causes above-mentioned, although near Fourteen Years of the Term contained in the said Letters Patent are elapsed, your Petitioner hath not hitherto had it in his Power to reimburse himself any Part of the great Expence he hath incurred, nor hath he any Prospect of being enabled so to do, or to carry his said Invention to the Heighth of Perfection and Cheapness he is persuaded it is capable of, unless the Term of the said Letters Patent is prolonged, the Effect of which Prolongation your Petitioner humbly presumes will be ultimately beneficial to the Public, and, he hopes, prove the Means of saving him from the Loss of a considerable Fortune expended and invested in the said Undertaking.

YOUR Petitioner therefore humbly prays this Honourable House to take the Premises into Consideration; and that Leave may be given to bring in a Bill for prolonging the said Letters Patent for such further Term, from the Expiration thereof, as to this Honourable House shall seem meet.

THE CASE
Of JOSEPH BRAMAH,

Inventor of the PATENT LOCKS for the Security of Life and Property:

With a few OBSERVATIONS on the Importance of this Article, and the Means of perpetuating its Utility to the Public;

Humbly ſubmitted to the Conſideration of the MEMBERS of both Houſes of Parliament.

IN England, and the Kingdoms united to it, it is lamentable to relate, that the Art of Thieving is matured into a Science, and has long demanded the greateſt Efforts of ingenious Men to deviſe Means of Security adequate to, or keeping pace with, the increaſing Neceſſity for them. But however competent have been the Inventions of many Mechanics, the Progreſs of the Miſchief is little abated; and it is evident to thoſe who will attentively conſider the Subject, that this Object, ſo very important in all civilized Countries, is beyond the Reach of human Power acting in an individual Capacity. National Evils call for national Interference; Misfortunes that fall heavy on all, demand in ſome way or other the Exertions of all to eradicate; wherefore the Efforts of Individuals muſt be ſeconded by the Arm of Government; and as I mean hereafter to prove that the Remedy for this dreadful Evil will uniformly and certainly tend to deſtroy its Origin, I humbly truſt that thoſe to whoſe Conſideration theſe Remarks are ſubmitted will treat the Matter with that deliberate Candour which its Importance merits; for whatever may prove the Deciſion, the Concern it may give an Individual, be he ever ſo intereſted, can be but trifling compared with its Conſequence to Society.

Among the Means employed to counteract this miſchievous Propenſity, a Lock has indiſputable Claims to Pre-eminence. In the early Stage of Vice, before the Mind is hardened by evil Councils and the frequent Repetition of trivial Offences, to remove the Temptation would ultimately extinguiſh the Deſire; and indeed it is the Duty of thoſe who poſſeſs Property to preclude all Poſſibility of Diſhoneſty; for the Servant who would never have meditated an Attempt on his Maſter's Cheſt may be tempted to purloin his Purſe if careleſsly thrown in his Way. When no Barrier has been oppoſed to the early Indulgence of evil Deſires, and Man, led by the frequent Gratification of them, commences open Depredations on the Public, there alſo the Security both of Life and Property are in no ſmall Degree dependant on the Capacity of this Inſtrument; for it is obſervable, that thoſe who are taken in the deſperate Occupation of Houſe-breaking are always furniſhed with a Number and Variety of Keys or other Inſtruments adapted to the picking or opening Locks, and the Inſtances in which they effect their Purpoſes without theſe are comparatively very few.

So far then as it is an Object of National Importance to improve the Morals of Mankind; ſo far as it is of Conſequence to Individuals to guard their Lives and Effects; ſo far it is neceſſary that a Lock ſhould be infallibly and inviolably ſecure.

But that the common Lock is by no Means of this Deſcription there are many lamentable Witneſſes. The numberleſs Victims of offended Juſtice, who were tempted to their firſt Eſſay by this fallacious Security, might be adduced as ſo many ſhocking Proofs; but the ſlighteſt Examination of their Conſtruction is ſufficient to ſhow, that *all Dependence on the inviolable Security of the beſt Locks in general Uſe is miſplaced.* The Number and Diſpoſition of the Wards, *fixed* in the Paſſage by which the Lever or Key is conveyed to the Bolt, determines their Security, on the Bit or Web of which Key thoſe Wards are neceſſarily expreſſed. There are few Locks in general Uſe, which the common Pick-lock is not perfectly competent to open; but it rarely happens that there is a Neceſſity even for this; for the trifling Latitude of Variation, which the Size of the Web will permit, being ſoon exhauſted, every ſucceeding Lock is then the Counterpart of ſome former one; accordingly we ſee, that from the infinite Demand for theſe Locks, there are Millions of Duplicates extant in this Country only; and that it is as eaſy to purchaſe a Key to any Lock ready made, as it is to buy both Lock and Key. This is an unavoidable Conſequence, reſulting from the Defects of the Principle, and the Methods made uſe of in manufacturing them; for it is obvious, that to obtain perfect Security on this Plan, no Two Locks, the Property of ſeparate Individuals, ſhould ever be the ſame; and from whence it appears, that were there no Variations but in Principle (viz. not in Magnitude of Parts) every ſucceeding Lock, from the firſt made, muſt be a new Invention; and that it would be neceſſary to preſerve a Duplicate of each, however great the Number, for the Purpoſe of effecting a varied Succeſſion. But the Man who gains his Subſiſtence by making theſe Locks has ſeldom either Talents or Will to perplex himſelf with ſtudying to make each ſucceeding differ from all former made by himſelf, or any Brother of the Trade. To prevent, therefore, being involved in this Labyrinth, and to avoid the conſtant Accumulation of Tools, which would be inevitable, and perhaps ruinous, he adopts the ſettled Practice of all common Lockſmiths; he procures a Set of what they call Pitching Keys, conſiſting of Two, Three, or Four different Kinds of Wards, by which Keys are made all the Locks his Sale requires, be they ever ſo numerous, during the whole Courſe of his Life; and One Set of what is called Bend-ward Tools laſt the ſame Time; theſe, at his Deceaſe, he bequeaths to his Sons, who uſe them in like Manner, and tranſmit them

them for the ſame Purpoſe to the next Generation. But beſide theſe, there is yet another Objection of ſtill greater Conſequence, and againſt which this Principle cannot poſſibly provide a Remedy. Though the Diſpoſition of the Wards be ever ſo artful, novel, and judicious, a ſkilful Workman, having Acceſs to the Entrance, will be at no Loſs to fabricate a Key, which ſhall tally as perfectly with them as if the Lock had been open to his Inſpection; and this Operation may not only be performed to the higheſt Degree of Certainty and Exactneſs, but is conducted likewiſe with the utmoſt Eaſe, and without any extraordinary Genius or mechanical Skill; for the Bit, which is intended to receive the Impreſſion, being fitted to the Key-hole, and the Shank of the Key bored to a ſufficient Depth to admit the Pipe, nothing remains but to colour the Bit with a Preparation, which, by a gentle Preſſure againſt the introductory Ward, may receive its Impreſſion, and thus furniſh a certain Direction for the Application of the Tool. The Bit being made to tally with the Firſt Ward, gains Admiſſion to the Second; and a Repetition of the ſame Means finally opens a Paſſage to the Bolt. It is from hence evident, that endleſs Variations in the Diſpoſition of *fixed* Wards are not alone ſufficient to the Purpoſe of perfect Security; and ſince no common Lock can be purchaſed, of which there is not an infinite Number of Duplicates abroad, all tending to induce a falſe Confidence, it might be queſtioned (was there no Remedy) whether the Vigilance and Caution every Man would have over his Property, in caſe no Locks were uſed, would not be a preferable Security.

The Evils which ſprang from theſe Defects had been long a Matter of ſerious Contemplation with me, when, after much intenſe Study, and many expenſive Experiments, I fortunately diſcovered a Faſtening to which none of the above mentioned Objections can poſſibly apply; and which I feel the utmoſt Aſſurance is abſolutely inviolable, and capable of Extenſion beyond all the Fineſſe of the ill-diſpoſed to overcome, by Force alone excepted. Its Properties and Mechaniſm are minutely explained in a Diſſertation on the Conſtruction of Locks publiſhed by myſelf, and they are conciſely as follows:

1ſt. The Uſe of the Pick-lock is totally and effectually excluded.

2nd. No Inſtrument ſhort of the perfect Key, or an exact Duplicate thereof, can have the Capacity of opening the Lock.

3d. There is no Poſſibility of obtaining the Form of the proper Key from without by Impreſſion, having Acceſs to the Key-hole.

4th. The Lock in Principle is capable of infinite Variation, without Difference of Magnitude or Shape; ſo that Locks may be fabricated with component Parts of preciſely the ſame Dimenſions, to the moſt remote Period of Futurity, without One Duplicate or Counter Part of any former, and re-arranged for One Key to paſs the Whole. Conſequently the Poſſeſſor of a Lock may make a Variation whenever Occaſion requires, which ſhall exclude any former Key.

This Property of Tranſpoſition, which ſuperſedes all Apprehenſions from falſe Keys, is clearly evinced by the following Arithmetical Table, which ſhews the proportional and the actual Sum of Security contained in each Lock, conſiſting of any given Number of Guards from Unity to Twenty-five; viz. ſo much of their Security only as reſults from the different Arrangements of their component Parts.

TABLE.

No of Guards.	Changes.
1	1
2	2
3	6
4	24
5	120
6	720
7	5040
8	40320
9	362880
10	3628800
11	39916800
12	479001600
13	6227020800
14	87178291200
15	1307674368000
16	20922789888000
17	355687428096000
18	6402373705728000
19	121645100408832000
20	2432902008176640000
21	51090942171709440000
22	1124000072777607680000
23	25852016738884976640000
24	620448401733239439360000
25	15511210043330985984000000

The Addition of another Figure will multiply the laſt Product 26 Times, and that Sum, by a continued Succeſſion be increaſed ad infinitum.

By this Table it appears, that a Lock with 6 Guards admits of 720 different Arrangements, or requires ſo many different Keys to open it under all its Variations; and that the Addition of a ſingle Guard increaſes the Number of thoſe Changes to 5040; which being progreſſively multiplied by additional Figures, will eventually produce the aſtoniſhing Sum therein ſtated. Now imagine a Lock to conſiſt of 25 Guards, and that as many Keys were prepared as would be neceſſary to open it under all its Variations, then the Chance of an Adventurer's putting his Hand on the only one that would tally with the Lock under its firſt Arrangement will be as Unity to the Number oppoſite 25; and ſuppoſing this Key ſhould be the very laſt tried (which is poſſible) he would then have them all to handle, and if each Trial could be made in 30 Seconds, it would take him 57461442099517020244 Julian Years, and conſequently if the World had already laſted 6000 Years, he would be employed 9576907016586170 ſuch Ages, without ever ſtopping one ſingle Second of Time.

An attentive Obſervance of this Table will ſatisfactorily prove, that the Principle is adequate both to inviolable Security and endleſs Variation of Suit; and that it is not only poſſible, but practicable beyond all Controverſy, to make Locks throughout the moſt diſtant Ages, of which no one Key can open any Lock, but that to which it reſpectively belongs, although every Variation ariſing from Magnitude and Shape ſhould be precluded; viz. ſuppoſing them all compoſed of duplicate Parts; nay, what is ſtill more miraculous, it may be ſaid of the ſafeſt Lock, which is here contemplated, that it bears no Proportion to the ſafeſt which the Principle will produce; for as the Increaſe of Security is infinite, and as Infinity cannot be ſubject to Diviſibility, the ſafeſt Lock that ever will be made, muſt be (in Principle) but as Unity to the ſafeſt that can be made.

It is neceſſary to obſerve, for the Uſe of thoſe who may not have ſeen the Diſſertation abovementioned, that the Parts which comprehend the neceſſary Security of each Lock are ſo contrived as to be tranſpoſible, and eaſily ſhifted from one Station to another. Theſe Parts, called Guards, have beſide this tranſpoſible Property for the Propagation of Suit, another Principle of Motion, on which depends chiefly their inviolable Safety; whatever is the Number, they preſent to the Eye in the Key-hole, when the Key is abſent, an even Surface or regular Projection, and each of them has the Power of controlling the Motion of the Bolt, till they all receive a ſeparate and diſtinct Preſſure or Change in their Station from without by the Application of an Inſtrument inſerted at the Key-hole, and forced againſt their exterior Ends. And being ſeverally liable to an Exceſs of Motion as well as a Deficiency, and there being no Poſſibility of aſcertaining the leaſt Trace from without of the Shape of the Key neceſſary to give them this Motion, the Probability of Succeſs in an Attempt to open them is wholly dependent on Chance, which Chance is as the Sum in the Table oppoſite the Number of Guards which the Lock contains compared with Unity. But it muſt be obſerved that this Number, although ſo prodigious in the higher Quantity of Guards, is not the ultimate Sum or Amount of the real Security, for this ariſes from Arrangement, only ſuppoſing the diſtinct Diſtance known to which each Guard ſhould be depreſſed, and their Places or Stations unknown; whereas there is a conſiderable Diſtance of Error on each Slider or Guard, which muſt likewiſe be taken into the Account, and whereby the final Eſtimate will be greatly enhanced.

From a clear and ſettled Conviction that the Inſtrument I diſcovered poſſeſſed theſe eſtimable Properties, which had been ſo anxiouſly ſought by the ingenious of many Ages, I endeavoured to add to the Invention of the Machine itſelf ſuch Rules and Methods of manufacturing, and ſo to œconomize the whole Concern, as to give the Invention its full and true Effect, and to perpetuate the ſame as far as poſſible to future Generations. By this Syſtem, which I have matured at great Pains and Expence, the Buſineſs is conducted with the utmoſt Regularity and Exactitude; the Arithmetical Tables, provided under that Syſtem, ſhew, beyond the Poſſibility of Miſtake, every paſt Tranſaction, and direct the future with an unequivocal Certainty, that Duplication is avoided. By this Plan alſo I am enabled to furniſh any Lock made by me with a Key of a different Suit from any former that may happen to be loſt, to which the ſaid Lock (or Locks, if more than One) may be adapted by a conformable Arrangement of its interior Parts, ſo that the Key miſſing will never after have the Power of performing its uſual Office on the Lock which it formerly commanded, and the Owner will be hereby freed, at a ſmall Expence, from every Apprehenſion of Injury, ſhould ſuch abſent Key ever find its Way to the Lock through ill Deſign.

The Uſe of counterfeit Keys being thus defeated, the Trade of manufacturing them can never commence in any ſerious Degree, as the very diſtant Chance of their anſwering the Purpoſe of the Ill-diſpoſed, will not juſtify the Expence.

I flatter myſelf it is unneceſſary to take up farther Time to prove the Perfection of this Invention, which may be denominated a Principle perpetually new, as I have already proved that every ſucceeding Lock can as eaſily be made to differ from all former, and that for ever, as they can be made Duplicates; a Lock, the Uſefulneſs of which can never be leſſened, but may by proper Management in manufacturing be handed to Poſterity with unabated Purity, and ever capable of performing inviolably the true Offices of this important Inſtrument.

But diveſting myſelf of every Idea of Self-intereſt, and viewing the Subject as pregnant with the moſt beneficial Conſequences to Society, I think it my *Duty* to ſtate, *that theſe Advantages cannot poſſibly be inſured them in their full Extent* without certain Regulations, to which the Authority of Government only can give Efficacy. For though the Invention clearly comprehends the excellent

excellent Properties above aſcribed to it, yet the greateſt Evil which attends common Locks, viz. an Accumulation of Duplicates, they will ſtill be expoſed to whenever they are liable to a random Fabrication, and ceaſe to be manufactured under the Controul of a ſcientific and well digeſted Syſtem.

That an Increaſe of Duplicates muſt diminiſh the Security of a Lock before inviolable is obvious on the ſlighteſt Conſideration. Suppoſe a Lock in Principle perfectly ſecure; a ſingle Duplicate will certainly leſſen that Security in a Ratio proportioned by the Probability or Improbability of the Key B. ever finding its Way to the Lock A. and, vice verſa, the Key A. to the Lock B.; and let the Sum of this Probability or Improbability, which depends on Circumſtances of Time and Place, be what it may, it certainly will form the determinate Security of each; and therefore, although the Lock A. was in Principle of infinite Security, the Lock B. will render both only finite; and that Security will be yet farther diminiſhed by every ſucceeding Duplicate; and that this Duplication of Locks and Keys will be the inevitable Conſequence of unreſtrained and promiſcuous Fabrication requires alſo as little Trouble to demonſtrate; for without a ſtrict Adherence to arithmetical Calculations, it will not be poſſible to aſcertain, when a Lock is making, whether it is or not the Counterpart of ſome former one; but ſuch a Rule the Experience of the common Lock above recited gives ſtrong Reaſon to preſume the Lockſmiths in general could not be brought to purſue, independent of the Difficulty, not to ſay Impracticability, of maintaining a Connexion between ſuch a numerous Body of Men of oppoſite Intereſts. It is alſo to be apprehended, that a Trade of manufacturing Duplicate Keys would be the Conſequence of ſuch irregular Tranſactions, whereby the Ill-diſpoſed would be readily furniſhed with any Number, to attempt the Accompliſhment of their Purpoſes; and though the tranſpoſitive Property of the Lock would be a partial Corrective for this Evil, yet much Miſchief might very probably reſult, which is a further Argument for the Neceſſity of ſome Reſtraint *.

I ſhall not preſume to propoſe a Method of rendering the Principle permanently uſeful to Society; but I hope I may be permitted to queſtion, whether any better Mode can at preſent be adopted, than at once to continue to the Public the Advantages which, during Fourteen Years, they have received from this Article, under the Conduct of a regular Syſtem, and afford a Compenſation to an Individual, who has laboured inceſſantly, and expended immenſe Sums, to perfect the Invention without any adequate Advantage.

I am aware that it may be ſaid, the excluſive Privilege of ſelling the Article for a certain Time is a Reward. That it was ſo intended, and that it is in moſt Caſes ſufficient, I am well convinced; but in this particular Inſtance that it has not been ſo I *feel* equally certain. The numerous Machines and Apparatus, which the Nature of the Buſineſs required, and others progreſſively introduced for the Sake of Accuracy and Diſpatch, have involved a Capital, on which (though the Sale is now conſiderable) I have not been able to realize a Profit equal to Five per Cent. having gradually lowered the Price (from a Deſire that the Public ſhould reap every poſſible Benefit from the Invention) in proportion as the Means employed curtailed the Expence of manufacturing, ſo that the ſame Article is now ſold at One-Third leſs Price than at the Commencement of the Buſineſs; and I have every Reaſon to believe a reaſonable Prolongation of the Term of my Patent will enable me to make ſtill greater Reductions of Price, as well as further important Improvements.

Indeed ſo coſtly are the Machines erected for making theſe Locks, that no Individual with a ſmall Capital could poſſibly undertake the Buſineſs, to do Juſtice to the Principle; and without them it muſt unavoidably ſuffer much Mutilation, or the Article be increaſed in Price in a Fourfold or greater Proportion; but as a Reduction in the Price would certainly be the Aim of a Competitor, of the Two Evils the former is the moſt probable, and that which in my Opinion it is of the greateſt Conſequence to the Public to prevent. At the ſame Time ſuch Competition will neceſſarily leave in a great Meaſure unemployed thoſe expenſive Implements above-mentioned, which have been made principally with a View to *perfect* the Invention, and which are the ſole Product of the Buſineſs; and as thoſe Tools are not adapted to any other Purpoſe, they will in ſuch Caſe be comparatively of no Value, wherefore it will be vain for the Patentee to expect even common Intereſt for the Capital veſted in the Concern, much leſs that Reward which, it muſt be allowed, is due to active Ingenuity.

Theſe are Facts which can be verified by the Records of my Tranſactions; and as I aſſure myſelf the Nation will not refuſe a Compenſation to the Individual who labours ſucceſsfully for their Service, I have ventured to lay before Parliament a Petition for the Extenſion of the Term of my Patent, a Copy of which precedes this Statement of Facts.

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* A Circumſtance which has recently fallen within my Knowledge, and which I will beg Leave to mention, ſerves to ſtrengthen the above Suppoſition. Having lately made Locks for the Gates in the Iron Railing of Portman Square, and ſupplied every Inhabitant with a Key, to exclude improper Company (who gained Admittance by Keys to the old Locks, which could be readily purchaſed in the Vicinity) and to prevent any Thing of that Kind in future, I was ſhortly after applied to by an eminent Ironmonger in the Neighbourhood, to know whether I would furniſh him with Duplicate Keys, or permit him to make them; obſerving at the ſame Time, that from repeated Applications already made at his Shop for them, he conceived it would turn to good account; and aſſuring me, he had received a Key of my make from a Perſon who had it in Poſſeſſion, to provide Duplicates to give to Friends, &c. I anſwered, that I was under Obligations not to ſell Keys to open thoſe Locks without official Orders from the Truſtees for the Management of the Square, and that if any Perſon attempted to make and vend them during the Continuance of the Patent, ſuch would be proſecuted; he was alſo informed, that the Moment it ſhould be diſcovered that any counterfeit Keys had made their Appearance, the Arrangement of the interior Works of the Lock would be varied, ſo as to render them uſeleſs.

THE

PETITION and CASE

OF

JOSEPH BRAMAH,

Of Piccadilly,

ENGINEER,

Inventor of the PATENT LOCKS for the Security of Life and Property.

FEBRUARY 1798.